THE 1990 PRESIDENTIAL ADDRESS—PART 2 AN INTRODUCTION TO THE BRITISH WAX-FLIES (NEUROPTERA: CONIOPTERYGIDAE) WITH A REVISED KEY TO BRITISH SPECIES

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The lacewings, (order Neuroptera) are soft-bodied, holometabolous insects ranging in size from a few millimetres to around 10 cm. The order includes the green and brown lacewings (Chrysopidae and Hemerobiidae), wax-flies (Coniopterygidae), ant-lions (Myrmeleonidae), ascalaphids (Ascalaphidae), giant lacewings (Osmylidae) and sponge-flies (Sisyridae), amongst others, in sub-order Planipennia with the alder-flies (Sialidae) and snake-flies (Raphidiidae) in sub-order Megaloptera. Most authors elevate these two groups to full order status, retaining the use of 'Neuroptera' specifically for the old 'Planipennia'. Around 6000 species of Neuroptera *sensu lato* are known worldwide; of the 300 or so of these which occur in Europe as a whole, exactly 63 Planipennia and seven Megaloptera are recorded as British as of 1 January, 1991. Together with four mecopterans, the 'lacewing-flies' make a convenient-sized group for any entomologist to study and there is the added bonus that as they are at present very poorly recorded indeed, there is ample scope for the discovery of species new to Britain. Indeed, in the last 5 years or so three such discoveries have been made.

The identification of lacewings has, however, presented a problem for many years and there has been no major review of the order since Frederick J. Killington's *A monograph of the British Neuroptera*, published as a two-volume work by the Ray Society in 1936 and 1937. This covered the Planipennia only. The Royal Entomological Society's *Handbooks for the Identification of British Insects* provided some guidance when, in 1959, volume 1, (parts 12–13), was produced under the authorship of Lt. Col. F. C. Fraser. However, this work, which included Planipennia, Megaloptera and Mecoptera, is plagued by a large number of errors and ambiguities and is to be regarded as unworkable by anyone who is not already able to identify the insects on sight! It is now also out of print. In recent years, the launch of a National Recording Scheme for Neuroptera, Megaloptera and Mecoptera has enabled the production of a newsletter twice yearly. This has not only allowed for an exchange of information on lacewings but has also provided a vehicle for the testing of 'provisional' identification keys prior to the production of a revision of the Royal Entomological Society's 'handbook'. Subscription is free, and anyone wishing to be placed on the mailing list has only to get in touch with me.

In Europe, greater interest in the group was aroused more recently with the publication by Aspöck *et al.* in 1980 of the two-volume work *Die Neuropteren Europas*. However, the high price and the reluctance on our own part to accept that the world can operate in anything other than the English language has meant that the work has not found a widespread popularity in the United Kingdom. However, after that briefest of introductions, it is on a single family of the Planipennia that I now wish to dwell.

CONIOPTERYGIDAE

Members of the Coniopterygidae differ at first glance from most other members of the Planipennia. They are small (none exceeds 8 mm across the wings in the British fauna) and in many respects resemble white-flies (Hemiptera: Aleyrodidae) which

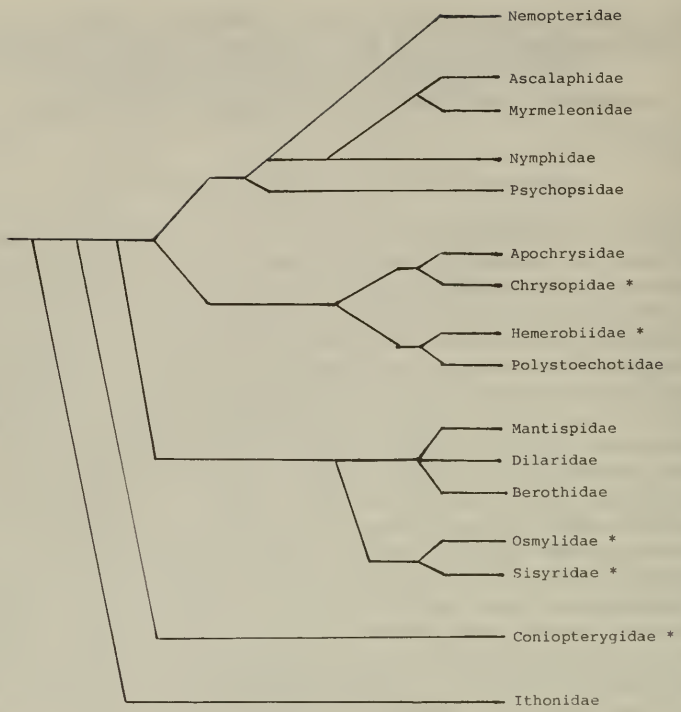


Fig. 1. The phylogeny of the British Neuroptera (after Aspöck *et al.*, 1980). The families represented in the British Isles are denoted*.

are a familiar pest of both indoor and garden plants. However, the venation of the wings serves at once to separate Coniopterygids from the almost veinless white-flies. The venation also provides evidence of the close relationship of the family, within the Planipennia, to the Hemerobiidae (Fig. 1). Another distinguishing feature is the presence of white or grey 'wax' which covers body, wings and all other appendages.

Locating the nocturnal adults is considerably easier than finding the earlier stages. The egg ranges from 0.4 to 0.5 mm in diameter and is laid on the plant which is host to the larval prey. They are usually laid singly. A small conical projection, often upturned can be discerned at the anterior end. Their colour is white, though in some species they tend to be tinged pink or yellow; this does not seem to be constant. In the genus *Coniopteryx* they darken a few hours before hatching but in the other species (excluding *Aleuropteryx juniperi* and *Helicoconis lutea* which I have never seen) they remain white throughout.

In common with all other British Neuroptera there are three larval instars. The first ecdysis takes place after about 4–5 days and seems to depend on the supply of food available to the larva, occurring later when food is in short supply. The larva attaches itself to the substrate by exuding a sticky fluid from the anal end and emerges through the dorsal surface of the old skin. The second instar generally lasts about 2 weeks and again seems dependent upon food supply. In the third instar the larvae are generally identifiable, at least to genus. They are rather short and rounded, being

widest in the region of the metathorax, though the members of the subfamily Aleuropteryginae are rather more elongate. In the subfamily Coniopteryginae the labrum projects forwards and covers the short, straight jaws in dorsal view, but in the Aleuropteryginae the jaws are rather elongate and needle-like, projecting well beyond the labrum. In both groups the antennae are two-segmented with the eyes placed just lateral to their bases. The abdomen is ten-segmented. A full account of larval morphology is given by Killington (1936) whilst the larva of *Aleuropteryx juniperi* is figured and described by Ward (1970).

In spite of the apparently biting mouthparts of the larva, the Coniopterygidae actually possess sucking mouths. Each mandible, together with a part of the corresponding maxilla forms a tube which is sunk into the victim. Fluid food is then ingested via this double-barrelled 'drinking-straw'! This is a characteristic shared by all the other families of the Planipennia and is one which serves to separate them from the Megaloptera which have truly biting mouths in the larval stage. The distal portion of the gut is closed so that digestive wastes are unable to reach the anus. What little waste does accumulate from the liquid diet remains within the animal until the emergence of the adult from the pupal case, when it is immediately voided as a dark, sticky pellet. Interestingly, the Coniopterygidae are unique amongst the Planipennia in having only six malpighian tubes, as compared to eight in the other families. These tubes are responsible for the production of silk during pupation.

At the end of the final instar, the mature larva spins a flat, round cocoon of white silk which in *Conwentzia* spp. and *Coniopteryx tineiformis* is usually spun on the under surface of the leaf, though other species may choose a crevice in the bark of a tree. These cocoons closely resemble the egg rafts of certain spiders and so are frequently overlooked. A prepupa then forms in the cocoon. The progeny of the first generation of adult wax-flies have a very short pre-pupal stage, a full pupa soon forming to give rise to the second generation of adults. However, autumn forming prepupae will usually over-winter in this stage, not pupating until the following spring. Emergence from the pupa may take place within the cocoon, when the pupa is halfway out or sometimes after the pupa has wriggled out completely.

Meinander's (1972) world revision of the Coniopterygidae listed 231 species. Since then, further species have been described worldwide and in 1990 a world check-list produced by Meinander showed 423 recent and 11 fossil species in the family. As far as our own country is concerned, however, we have only 11 different kinds! Meinander also revised the higher taxonomy of this group, dividing up into three subfamilies containing 23 genera as follows:

CONIOPTERYGIDAE
Subfamily Aleuropteryginae
Tribe Aleuropterygini
Genus *Aleuropteryx* Low, 1885*
Genus *Heteroconis* Enderlein, 1905
Tribe Coniocompsini
Genus *Coniocompsa* Enderlein, 1905
Tribe Fontanelleini
Genus *Bidesmia* Johnson, 1976
Genus *Cryptoscenia* Enderlein, 1914
Genus *Paraconis* Meinander, 1972
Genus *Helicoconis* Enderlein, 1905*
Genus *Spiloconis* Enderlein, 1907
Genus *Vartiana* Aspöck & Aspöck, 1965

Tribe Fontanelleini *(continued)*
Genus *Neoconis* Enderlein, 1929
Genus *Pampoconis* Meinander, 1972
Genus *Pseudoconis* Meinander 1972
Subfamily Brucheiserinae
Genus *Brucheiser* Navas, 1927
Subfamily Coniopteryginae
Tribe Coniopterigini
Genus *Neosemidalis* Enderlein, 1930
Genus *Stangesemidalis* Gonzales Olazo,1984
Genus *Nimboa* Navas, 1915
Genus *Coniopteryx* Curtis, 1834*
Genus *Parasemidalis* Enderlein, 1905*
Genus *Incasemidalis* Meinander, 1972
Genus *Thecosemidalis* Meinander 1972
Tribe Conwentziini
Genus *Hemisemidalis* Meinander, 1972
Genus *Conwentzia* Enderlein, 1905*
Genus *Semidalis* Enderlein, 1905*
*denotes genera represented in the British Isles fauna.

Set against this background, the British species may now be examined.

Killington (1936–1937) recognized the five genera *Aleuropteryx* Low, *Conwentzia* Enderlein, *Semidalis* Enderlein, *Parasemidalis* Enderlein and *Coniopteryx* Curtis as representing the British fauna. This was copied by Fraser (1959) and both authors recognized a total of seven British species—three in *Coniopteryx* and one each in the other genera. Later, Meinander (1972) transferred the British *Aleuropteryx lutea* Wallengren to the genus *Helicoconis* Enderlein, but the earlier discovery in Britain of *Aleuropteryx juniperi* Ohm at Box Hill in Surrey (Ward, 1970) meant the retention of *Aleuropteryx* as a British genus. Killington himself suspected that our *Parasemidalis annae* (Enderlein) was synonymous with the continental *P. fuscipennis* (Reuter) apparently overlooking the earlier work of Esben-Petersen (1929) which had already formally synonymized the two. This is now an accepted view (e.g. Barnard, 1978). In addition, one new species of *Conwentzia* and two of *Coniopteryx* have been added to the British list, giving us a new total of 11 species in six genera at 26 February 1991. I now propose to briefly review each of these species.

Helicoconis Enderlein

In 1905, Enderlein removed *A. lutea* (Wallengren) from *Aleuropteryx* and placed it in a newly created genus *Helicoconis*. This did not, apparently, meet with universal approval. It was added to the British list by Heslop-Harrison (1916) who beat adults from both *Larix* and *Betula* beside the River Wear at Wolsingham, Durham in July 1915 and who regarded it as being synonymous with *Aleuropteryx*. Killington (1936) in his monograph of the British Neuroptera expressed doubts as to whether or not the two genera were distinct and stated that he preferred to follow Harrison in his 'lumping' of the two. Interestingly, however, he added that he had not had any opportunity to make a detailed examination of any species belonging to this group. Predictably, Fraser (1959) copied Killington without comment. More recently, Meinander (1972) reviewed the world Coniopterygidae and provided firm reasons not only for segregating the two genera but for placing them in quite separate tribes of the subfamily Aleuropteryginae.

The claim of this species to 'British' status is slender. Since Heslop-Harrison's record from Durham, a second site was added when a single adult was beaten from the lower branches of a *Cupressus* at Silwood Park, Berkshire on 20.vi.1966 (New, 1967). However, as recently as February 1991, this specimen was critically examined by Steven Brooks at the BM(NH) and shown to be a male of *Aleuropteryx juniperi*. I am grateful to Dr Brooks for his permission to mention this.

Exhaustive enquiries have singularly failed to uncover the whereabouts of the specimens collected by Heslop-Harrison. They are certainly not in any of the national museums, nor indeed in any of the more obvious local museums in the north-east of England. They are certainly not present amongst his Lepidoptera, plant and bird specimens, the whereabouts of which are known. In view of this, and in view of the poorly understood nature of Coniopterygid taxonomy in 1916 I am personally rather reluctant to retain *H. lutea* as a British species. However, the pleasure of potentially removing a species from the British list I shall leave to Dr Brooks! For the time being, therefore, the Durham record must stand.

Aleuropteryx Low

This genus is represented in Britain by a single species, known from only two localities—in Surrey and Berkshire.

A. juniperi has in the past been confused with *A. loewii* Klapalek, a European species not at present known from Britain, and *Helicoconis lutea* Wallengren which, for some time had been considered to belong to *Aleuropteryx*. Ohm (1968) separated *A. juniperi* as a valid species and subsequently specimens were found to exist in the collections of several European museums. The known distribution now seems to involve Romania, Greece, Italy, Austria, Germany, France, Spain and Britain.

It was introduced as a British species when, during 1968, Dr Lena Ward collected several coniopterygid larvae from native *Juniperus* at Box Hill, Surrey and identified these as belonging to the Aleuropteryginae. Sadly, no adults emerged from the captive larvae but during July of the following year Dr Ward revisited the site and succeeded in beating two adult *A. juniperi* from the junipers there (Ward, 1970). In addition, as we have just heard, an adult *A. juniperi* was beaten from *Cupressus* at Silwood Park, Berkshire on 20.vi.1966 and was erroneously recorded as *Helicoconis lutea* (New, 1967).

The larvae of *A. juniperi* were described and figured by Ward (1970) from the Box Hill specimens. At this locality they were clearly associated with the juniper scale insect *Carulaspis juniperi* Bouche. In Europe, *A. loewii* has been recorded feeding upon the scale insects *Aspidiotis abietis* Schr. and *Leucaspis pini* Hartig living on *Pinus mughus* Scop. and it has always been assumed therefore that the British *A. juniperi* had a similar habit and were feeding on the juniper scale. It should be pointed out, however, that this still requires verification should the lacewing prove still to be extant at Box Hill or, indeed, elsewhere in Britain. If the increasing demand by the horticultural trade for ornamental conifers assists the spread of *Carulaspis juniperi* then there is no reason at all to suppose that the lacewing may not exist elsewhere in southern England too.

It should be noted that the statement in Kirby (1991) that *A. juniperi* has been recorded at a number of other localities is erroneous, stemming from a misreading by this author of *C. juniperi* as *A. juniperi* in Ward (1970).

Parasemidalis Enderlein

Enderlein (1905) described *P. annae* as a distinct species from *P. fuscipennis* on the basis of the termination of the cross-vein between R1 and Rs in the hind wing

on R2 + 3 instead of on the stem of Rs, by the pubescence on the wing and by the slightly darker hind wing. However, all of these characters can be shown to be extremely variable and most British workers appear to have suspected that they are both one and the same species. The types of both species are female. Ward (1961) noted that amongst 13 males from a Hertfordshire site were examples of both extremes and some intermediates. Further, several intermediates were asymmetrical, having the characters of *P. annae* on one wing and of *P. fuscipennis* on the other. The genitalia of all 13 examples were constant and conformed to the drawings given by both Withycombe (1922) and Killington (1936) and he suggested that the two were synonymous. In fact the two had already been formally synonymized by Esben-Petersen (1929) even though the type specimens are female and, worse still, the abdomen of *P. fuscipennis* is lost. Meinander (1972) in his world review of the family, accepted Esben-Petersen's view, which is now generally accepted by most workers, the rule of priority favouring *P. fuscipennis* as the correct name.

The species was first recorded as British in 1922 when a single female was collected by beating *Pinus sylvestris* L. at Oxshott, Surrey on 17.vi.22 (Withycombe, 1922). Later that same year, 14 further examples were taken in the same locality by Withycombe and China (Killington, 1932). A further example was taken on 26.vi.22 at a window in the Hope Department Museum at Oxford. The next capture recorded was not until 1927, when a female was taken at rest on the stem of *Typha latifolia* L. at Shalstone, Buckinghamshire on 1.viii.27 (Richards, 1928). Further examples were taken by Killington from *Pinus sylvestris* in the New Forest on 21.vi.31. All of these records were included by Killington in his 1936 monograph. Fraser (1959) adds a record from Westerham, Kent made prior to 1951, but both authors were clearly unaware of another from Barton Moss, South Lancashire on 27.iii.1932 collected by H. Britten and now in the collection of the Liverpool Museum. There then appears to have been no further records until as late as 1959. In that year and the following one, a total of 13 males was taken at mercury vapour light at Whetstone, Hertfordshire (Ward, 1961).

In 1966 it was taken at Ainsdale Dunes, Lancashire on 21.viii. In more recent years, a single male was recorded on 12.vi.1984 from oak trees in Richmond Park, Surrey during insecticide knock-down sampling (Barnard *et al.*, 1986), and Steven Brooks also took an example in Haringey, north London, on 31.viii.1984. Dr Joan Morgan recorded one in a Rothamsted Insect Survey light trap at Bangor, Caernarfonshire on 5.vi.1980. During 1990 it also turned up in a Rothamsted light trap at Harpenden, Hertfordshire on 8.vii, and in my own m.v. trap in my garden at Bishop's Stortford in the same county on 11.vii., whilst Bill Ely took an example near Scarborough, Yorkshire on 9.vi.—the most northerly British record. Specimens from other Lancashire and Cheshire localities (Britten, 1943, 1972) require confirmation and may be misidentified.

Amongst the 11 known British coniopterygids this species stands out as the only one with sooty grey wings—the remaining 10 being, essentially, snowy white (although some *Coniopteryx borealis*, especially females, can also be rather dark in colour). As interest in the family as a whole grows time will no doubt prove it to be a widespread and possibly fairly prevalent species at least in the southern part of Britain. It is normally associated with conifers, with *Pinus sylvestris* the most frequently reported tree though it was taken from an oak in Richmond Park (Barnard *et al.*,1986) and is recorded on oak in Switzerland (Eglin, 1940). *Pinus sylvestris* is certainly present in the vicinity of the two Hertfordshire trap sites and, indeed, nearby the oak tree sampled in Richmond Park. Little is known of the early stages, but it almost certainly feeds as a larva on various aphids restricted to *Pinus*.

The flight period of *P. fuscipennis* is, on the basis of the records known, June to August. The fact that there are slightly fewer July records than for the months either side may suggest a bivoltine nature, which would be in keeping with the other members of the family in this country.

Semidalis Enderlein

Our only British representative of this genus is widespread and apparently quite prevalent in Britain, as indeed it is in Europe where it extends from Finland to Gibraltar, and eastwards from here along the northern seaboard of the Mediterranean to the Caspian. Its apparent absence from the western USSR is probably a result of there being no active collectors in that area rather than a genuine absence. Of more interest to British entomologists is the fact that Killington (1936) reported a complete absence of records from both Wales and Ireland; this still, apparently, remains the case.

Whilst most of our British Coniopterygidae are regular visitors to light traps, *S. aleyrodiformis* is rarely taken at light—at least on the basis of current records. It is, however, found on a greater variety of deciduous trees than any of the other species in the family. Killington (1936) listed hawthorn and oak as the principal trees, and added that it had also been taken on alder, birch, elm, maple, lime, blackthorn, hazel, sallow, apple, pear, holly and ivy. I have never personally taken adults from hawthorn, pear or ivy but have beaten it from the foliage of all the others. Unfortunately, however, I have been quite unable to add any other tree species to Killington's list! The conspicuous black patterning of the larva, present even in the first instar, makes it an easy species to separate from the other British Coniopterygids.

S. aleyrodiformis is double brooded, with adults on the wing in May/June and July/August. There is a very definite population peak in July. Whilst the progeny of the second brood overwinter, like the other members of the family, in the pre-pupal stage, Killington (1936) records that some of the first brood of larvae (the progeny of these over-wintering pre-pupae) enter a state of torpor in May and remain so all summer to overwinter and pupate in the Spring! I have no data which confirms or denies that this is the case.

Conwentzia Enderlein

Killington (1936) recognized only *C. psociformis* (Curtis) as a British species, regarding the darker winged *C. pineticola* Enderlein as a mere form. This is a view which has never been shared by continental workers. Enderlein (1905a) cites *C. pineticola* as the genotype, though Killington (1936) dismissed this without any explanation stating that *C. psociformis* should be elevated to this position. Fraser (1959) copied Killington, stating that the only difference was that *pineticola* was darker and had fewer antennal segments. Although in lateral view the terminalia of the males show remarkable similarity, a caudal view shows differences which are both striking and constant. The two clearly differ in the alignment of the parameres and the shape of the inner process of the ectoproct of the male genitalia (Figs 13, 14, 15), as well as in the size of the tenth sternite viewed from this angle. The full specific status of *C. pineticola* was recognized in the world review of the family by Meinander (1972) and Barnard (1978) was the first British author to accept this in print, in his check-list of British Neuroptera.

The separation of the females of the two *Conwentzia* species is less clear cut than in the males. Collyer (1951) suggested separation of the two species on the basis of the number of antennal segments (28 to 36 in *C. pineticola* and 36 to 43 in *C. psociformis*).

However, she did not differentiate between the sexes of the 60 specimens used in her study and, worryingly, stated that the male genitalia of her *C. pineticola* were identical to that of her *C. psociformis*. Later, Zeleny (1961), also separated the females on the basis of the number of antennal segments whilst more recently Greve (1966) reported that in Norway, females of *C. psociformis* have from 36 to 43 antennal segments and females of *C. pineticola* from 30 to 35. British material I have so far examined indicates agreement, with the larger, darker individuals having between 31 and 35 segments ($n = 103$) and the smaller pale ones having 36 to 39 ($n = 275$). However, since the female genitalia seem to provide no scope for separation of the species it is desirable to examine individuals that have either been bred or have been captured *in copula* with known males. This I have not had the opportunity to do with British material and I think that until such an opportunity arises it is highly unsafe to separate females of *Conwentzia* in Britain on the basis of the number of antennal segments. From a practical viewpoint, it is worth adding that apart from the difficulties of actually counting antennal segments, it is often the case that antennae are partly or entirely missing in many specimens—especially those culled from light trap samples or malaise traps. The distribution maps are, therefore, based entirely on records of males.

My own records, together with others submitted to the National Recording Scheme and those older specimens which were both available for checking and not wanting in capture information (a rare combination it seems), clearly indicate that all the records of *C. pineticola* were made either by beating adults from *Pinus sylvestris* or from light traps in the vicinity of this tree. Though *C. psociformis* often appears in the same light traps I have no knowledge of it ever having been taken directly from *P. sylvestris* or, indeed, any other coniferous tree. I have found it myself on oak, maple, birch, beech and holly trees and observed adults feeding on aphids of the family Phylloxeridae. Killington (1936) stated that it was frequently found in large numbers on oaks infested with *Phylloxera* spp.

To those studying distributions of species, the failure to recognize the existence of a second species poses a familiar problem. For, though both Killington and Fraser regarded *C. psociformis* as very common, very few voucher specimens exist. Even in cases where 'form *pineticola*' is indicated it may be unwise to accept records where the genitalia has not been seen (Killington stated that he could not find any differences in genitalia—a statement which must surely cast doubt on the validity of some of his identifications). The European distribution maps given by Aspöck *et al.* (1980) are something of an embarrassment for British entomology; we are the only country for which records can not be separated. There seems to be a tendency towards 'if in doubt, lump them together' amongst us British—a highly unscientific and unhelpful attitude. Surely, if there is any doubt at all it is wise to segregate records as they are made. Segregates can always be aggregated; aggregates can never be later segregated without recourse to the original material!

In passing on it may be mentioned that similar problems also exist in the Chrysopidae where form *prasina* Burmeister of *Mallada ventralis* (Curtis) has also been elevated to specific status whilst *Chrysopa commata* Kis & Ujhelyi has been split from *C. phyllochroma* Wesmael.

Since Killington (1936) did not recognize the two *Conwentzia* species as distinct his statement that *C. psociformis* was double brooded and on the wing from April to October may or may not have been correct. Fraser (1959) expanded the range of dates for this species pair to November. Barnard *et al.* (1986) recorded *C. psociformis* almost continuously from 15.v. to 26.ix. at Richmond Park, with peaks of numbers on 30.v. and 25.vii. This clearly is in keeping with the pattern expected of a bivoltine

species though, as the authors point out, the relatively low numbers ($n = 54$) and lack of larval information render this a tentative conclusion only.

There appears to be no more recent work on the adult phenology of this genus in Britain. My own observations, together with a large number of records submitted to me for the national recording scheme do not, however, disagree with previously claimed flight periods, though I have no records of either species in April, October or November for the last 20 years or so and have been unable to trace the records from which either Killington's or Fraser's statements were derived. Both species do indeed appear to be bivoltine, and adults are in evidence from May to September with *C. psociformis* most numerous in July and *C. pineticola* in September.

Coniopteryx Curtis

Killington (1936) recognized three species of *Coniopteryx* as being British—*C. tineiformis* Curtis, *C. borealis* Tjeder and *C. pygmaea* Enderlein. Since then Meinander (1972) has shown that the species which we have been referring to as *C. pygmaea* Enderlein is in fact *C. parthenia* Navas & Marcet. The true *C. pygmaea* occurs in Germany, Austria and Romania, whilst *C. parthenia* spreads from North Africa to Lapland and from the Atlantic to the Caspian—including Britain.

The first couplet of Fraser's (1959) key to *Coniopteryx* separates *C. parthenia* from the other species on the basis of veins Sc2a and RCV being aligned to form a straight line (see Fig. 2). This he does with no mention of the difficulty with this extremely variable character which was clearly experienced by Killington (1936). I shall deal with identification later, but for the present, let it be said that this character simply does not work as a reliable means of separation and that genitalia should be examined before records are committed to paper.

At the time of Killington's monograph, *C. borealis* was allegedly known only from two specimens collected by Morton in Scotland (Rannoch, July 1903 and Roslin Glen, June 1934). The same two records are repeated by Fraser (1959) in the RES handbook. Both authors clearly overlooked a Surrey specimen in the C. A. Briggs collection at the National Museum of Wales, taken as long ago as 1895 since when it has remained labelled as *C. tineiformis* until I critically examined it myself recently. The numerous records which I have to hand of *Coniopteryx borealis*, all made in the last 10 or so years by examining the male genitalia of captured specimens indicate that the species is currently widespread and very common. It is clear that earlier authors were not in the habit of making the necessary critical examinations and I venture to suggest that all previously published records of *Coniopteryx* species should be disregarded unless the specimens can be located. Several recent records were listed by Barnard (1985) and I have records of *C. borealis* from South Devon, East Kent, Surrey, Essex, Hertfordshire, Middlesex, Bedfordshire, West Norfolk, Northamptonshire, Leicestershire, South Lincolnshire and Shropshire vice-counties and have also found it in light trap samples from both Jersey and Guernsey in the Channel Islands. Specimens taken in the Rothamsted light trap at Harpenden during 1990 show that *C. borealis* outnumbers the allegedly more common *C. tineiformis* by eight to one whilst the August 1990 samples from the Rothamsted light trap at Yarner Wood in South Devon revealed 27 male *borealis* compared to just one male *tineiformis*. Two separate mercury vapour traps in Bishop's Stortford, Hertfordshire also recorded *C. borealis* more frequently than the other species in both 1989 and 1990 though in Richmond Park, Surrey, *C. borealis* and *C. tineiformis* were collected by insecticidal fogging of oak trees in roughly equal numbers during 1984 (Barnard *et al.*, 1986).

It was another of the Rothamsted light traps that provided the greatest surprise however. From the trap at Wisley, Surrey, operated by our new President Andrew Halstead, a male *Coniopteryx* taken on 20.vii.1986 was identified by Bert Hynd as *C. lentiae* Aspöck & Aspöck, a species new to Britain (Hynd, 1989). A year later, on 3.vi.1987, another new British species, *C. esbenpeterseni* Tjeder was taken by Mr Halstead in the same trap (Hynd & Plant, 1991). Both of these specimens were recognized as belonging to *Coniopteryx* from their wing venation and so were expected to be one of the three existing species. However, examination of the genitalia showed that they both belonged to a quite different subgenus, *Metaconiopteryx*, characterized by the parameres, processus and aedeagus forming a circular structure in lateral view. In *C. lentiae* this ring is similar in height to the hypandrium (modified ninth sternite) viewed laterally, whilst in *C. esbenpeterseni* the ring is only about half the height of the hypandrium (see Figs 19 and 20).

Since these two initial discoveries I have been able to discover further examples. During last year, I found two males of *C. esbenpeterseni* in the June 1989 sample from the Rothamsted light trap at Harpenden. As a consequence I asked the trap operator, Dr Adrian Riley, to separate out nightly catches of Coniopterygids during 1990. This tedious task he willingly performed and his efforts in producing for me 84 tubes of specimens were fully rewarded when I discovered that the 1990 catch from his garden included not only eight males of *C. esbenpeterseni* but also three males of *C. lentiae*. The next discovery came in December 1990 when I found two males of *C. lentiae* in the collections of the National Museum of Wales. Both were from Box Hill, Surrey, a matter of a few miles away from Wisley, but the greater interest lies in that they were collected nearly a hundred years ago—in June 1895! This clearly suggests that *C. lentiae* has been present as a quite undetected species in Britain for a long time. Since this discovery, Dr S. Brooks has critically examined all of the British collected *Coniopteryx* material at BM(NH) and as a result has discovered two examples of *C. esbenpeterseni* taken during the last century (Darenth, West Kent, 3.vi.1878, coll. McLachlan; and near Croydon, Surrey, 30.v.1881, coll. Eaton) indicating that this species too has been present in this country as an overlooked species.

During the early part of the year I have managed to find specimens of *C. lentiae* in 1990 Rothamsted light trap samples from Ham Street (East Kent) and Jersey (Channel Islands) and specimens of *C. esbenpeterseni* in similar samples from Ham Street, from Empingham (Leicestershire) and from Preston Montford (Shropshire). This spread of records clearly indicates to me that both species have been with us for a long time, undetected and very probably misidentified and there is no doubt in my mind that both these new species will prove to be widespread and common in most of England at least. *C. esbenpeterseni* is also known from southern Norway (Greve, 1971, 1987) and so may possibly also be present in Scotland. The possibility of further species being discovered should not be overlooked. *Coniopteryx (Metaconiopteryx) tjederi* Kimmins is a candidate for discovery in the south-east of England whilst *C. (Holoconiopteryx) haematica* McLachlan could be discovered in the south. The genitalia of both are figured by Aspöck *et al.* (1980). As in so many groups, the Irish fauna is particularly poorly known and so new species to Ireland may also be discovered.

As far as the adult phenology of *Coniopteryx* species is concerned Killington presented no data for *Coniopteryx borealis* though Fraser gave May to June on the basis of the only two records known at the time. Barnard *et al.* (1986) recorded five males in May and one in August at Richmond Park. The very large number of recent records however, have enabled the elucidation of the adult flight period. *C. borealis* is recorded from 2.v. to 13.ix. in southern England and is evidently double brooded—in keeping with the other members of the subgenus—the two batches of adults appearing

in May/June and then July/September, with the insect most numerous of all in the first two weeks of August. Present day data for *C. tineiformis* coincides exactly with that given by both Killington and Fraser, with two broods of adults in May/June and July/August. However, whilst *C. borealis* is more abundant in the late summer, *C. tineiformis* populations have peaked in May for the last 5 years. I have no data which corroborates Killington's assertion that there are three broods in some years. For *C. parthenia* Killington stated that there were two broods—in May/June and July/August but added that adults could be found in some years as late as December whilst the insect could be found in all of its stages from May to August. Fraser gave May to October for the adults. As this is the least commonly recorded member of the subgenus *Coniopteryx* on the basis of recent records I can only state that I have recorded it from May to August in a pattern which tends to agree with a bivoltine habit.

The data on the two *Metaconiopteryx* species is, of course, as new to Britain as the insects themselves. *C. (M). esbenpeterseni* seems to have a phenology which agrees well with the three *Coniopteryx* s.str. species, being recorded from May to August in a pattern which clearly does not disagree with it being bivoltine ($n = 17$). There is a peak of adults in June. *C. (M). lentiae* is reported seven times in June and once in July. This seems to me to be too short a period to suggest a bivoltine nature but in view of the very small sample ($n = 8$) this statement may prove incorrect. It would be strange indeed if this single member of the Coniopteryginae were to be univoltine in Britain.

Identification

The species of *Aleuropteryx*, *Helicoconis*, *Semidalis* and *Parasemidalis* can be readily identified using wing venation characters. However, this may not be so if additional as yet undiscovered, species are present and so it should be stressed that it is unavoidably essential to confirm all such determinations by an examination of the male genitalia. I have been trying very hard for a very long time to sort out the five British *Coniopteryx* and our two *Conwentzia* on the basis of their external characters, with the aim of producing here a usable identification key; but I have to report that I have been unsuccessful. The alignment of veins Sc2a and RCV is very variable in specimens of *Coniopteryx parthenia*, with some specimens differing on each of the fore wings! Fraser's (1959) key should therefore be disregarded. I can find no other venational or other external morphological characters which remain constant in all the material examined and it has become perfectly clear from the re-examination of very many museum and private collections in the last 3 years that male genitalia provide the only reliable way of separating the species within each of these genera. As recording scheme organizer I am now, therefore, accepting records of these species only where male genitalia have been examined and, at the risk of offending those who sent in records without specifically stating the sex on the recording card, my distribution maps take this into account (Plant, 1991).

Though abdomens can be detached from specimens with patience and care I favour the view of most workers that the Coniopterygidae should be preserved in fluid. Seventy per cent aqueous ethanol (industrial methylated spirit is about 90% by volume and should be diluted) is the medium of choice though a 1% aqueous solution of polypropylene phenoxytol (also of immense value in pitfall traps) shows great potential. The latter is also both non-flammable and obtainable without an Excise licence. The entire insect is cleared by placing in a tube of 10% aqueous potassium hydroxide (caustic potash) and standing this in a bowl of freshly boiled water from the kettle. After the first few minutes it is desirable to use a setting needle or

similar to ensure that the specimens are immersed as they frequently float on the surface, buoyed and protected by their wax coating. Submerged specimens are usually sufficiently cleared after 40 minutes if the hot water is replaced as it cools. An overnight soak at room temperature has the same effect in general though I prefer to keep an eye on things as it is easy to digest the entire specimen leaving only the genitalia as evidence! Cleared animals are then placed in warm water for 5 minutes to wash out the potash and can then be examined in a drop of fresh water. Preservation is a matter of gradual dehydration through increasing concentrations of alcohol before final storage either in alcohol, or in a Durham tube with glycerol if required to be pinned in a cabinet, or for preparation as a microscope slide. The latter has the disadvantage of fixing a single plane of vision whilst the former two allow greater flexibility and are far less time consuming.

The genitalia of males provide good characters for identification to specific level. In *Coniopteryx*, the ninth sternite is modified in the posterior half to form a heavily sclerotized structure known as the hypandrium. The shape of this in both lateral and ventral view provides a simple means of species indentification (Figs 16–25). In addition, the shape and arrangement of the parameres, the two halves of the aedeagus and the ventral process of the tenth tergite also provide useful characters.

Fraser's (1959) key provides some fairly unrealistic drawings of the hypandria of the three *Coniopteryx* species known at that time but does not illustrate the internal genitalia of any species. Killington's monograph (1936) also provides drawings of the hypandria of the same species but those of *C. tineiformis* and *C. borealis*, especially the ventral view of that of the latter species, leave a great deal to be desired! The latter author also includes lateral views of the internal genitalia of *C. tineiformis*, *C. borealis*, *S. aleyrodiformis* and *P. fuscipennis* but omits the other species covered in the text. His caudal view of the parameres of *Con. psociformis* appear to be midway between this species and *Con. pineticola*. This may be deliberate given the author's strong feeling that the two were a single species! A better drawing is given by Barnard (1978). Hynd (1989) illustrates the lateral view of *C. lentiae* whilst a similar view of *C. esbenpeterseni* is given in Hynd & Plant (1991). Whilst the genitalia of all the European Coniopterygidae are given in Aspöck *et al.* (1980) there does not appear to be a single publication in the British literature which illustrates all our own species. I therefore take this opportunity to present lateral views of the cleared abdomens of all 11 British species, together with the ventral aspect of the hypandria of the five *Coniopteryx* species so far recorded and the caudal aspect of the genitalia of male *Conwentzia* species.

Taking into account all of the various problems presented here, I now conclude by presenting a new, revised key to the Coniopterygidae so far known to occur in the British Islands.

Revised key to known British species of Coniopterygidae

1. Hind wings vestigial or at least much reduced—narrow and strap like (Fig. 7) ..... *Conwentzia* 6
— Hind wings normal, about same size and shape as fore wings 2
2. Median vein in hind wing not forked (Fig. 8) ..... *Coniopteryx* 7
— Median vein in hind wing forked (Figs 3, 4, 5, 6) 3
3. Cross-vein between median and cubital veins in hind wing (vein MCCV, Fig. 2) placed basal to the fork of median vein. In the hind wing, the basal stem of the median vein and vein Cu1 are divergent throughout most of the length of M before it forks (Fig. 5). Whole insect dark grey ..... *Parasemidalis (fuscipennis)*

— This cross-vein placed after the fork of the median vein (or absent). In the hind wing the basal stem of the median vein is closely parallel with vein Cu1 throughout most of its length, scarcely diverging until the fork of M (Figs 3, 4, 6). Insect usually white—sometimes darker 4

4. Median vein of fore wing with two short bristles on upper surface—one on each side of the origin of the cross-vein between M and Cu1 (Figs 3, 4). Galea of maxilla with 3 segments 5

— Median vein lacking these bristles (Fig. 6). Galea of maxilla with only 1 segment ..... *Semidalis (aleyrodiformis)*

5. Vein Cu2 in the fore wing sinuous. In the hind wing the radial cross-vein (vein RCV, Fig. 2), meets radial sector before the fork of R_{2+3} and R_{4+5} (Fig. 3) ..... *Aleuropteryx (juniperi)*

— Vein Cu2 in the fore wing straight. In the hind wing, the radial cross-vein meets the radial sector after the fork—on branch R_{2+3} (Fig. 4) ..... *Helicoconis (lutea)*

Males of *Conwentzia* spp.
(females can not be separated on present knowledge)

6. Parameres in caudal view more or less parallel, or slightly divergent at the tips. Distance between the two tips about half the length of the parameres themselves or less. Inner process of ectoproct not, or slightly forked (Fig. 15). ..... *psociformis*

— Parameres in caudal view strongly divergent at tips, so that distance between tips is about equal to the length of the parameres themselves. Inner process of ectoproct strongly forked, the upper arm often longer than the lower one. (Fig. 14) ..... *pineticola*

Males of *Coniopteryx* spp.
(females can not be separated on present knowledge)

Refer to genitalia drawings (Figs 16–25) for specific identification within the two subgenera.

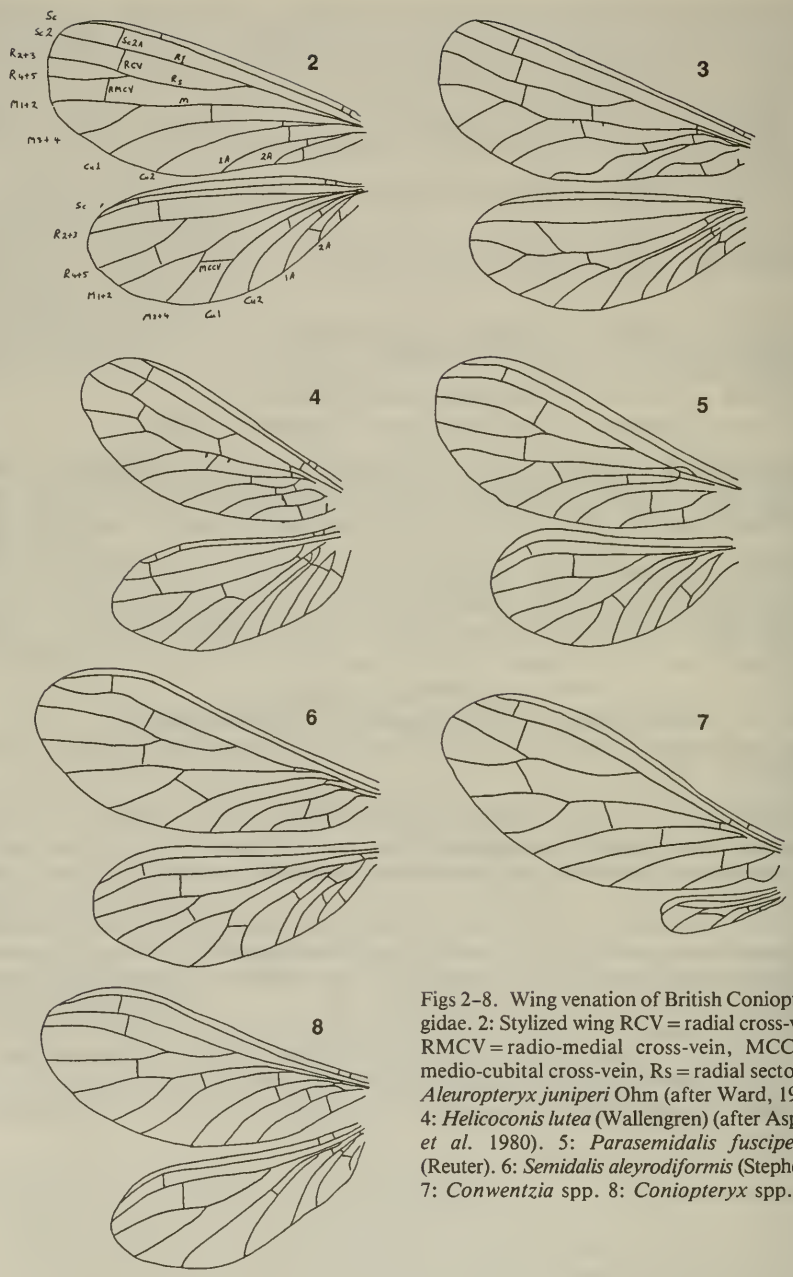
7. Lateral view of cleared abdomen revealing the genitalia arranged in a ring (Figs 19, 20). subgenus *Metaconiopteryx* 8

— Lateral view of abdomen with genitalia not arranged in a circle (Figs 16, 17, 18) ..... subgenus *Coniopteryx*

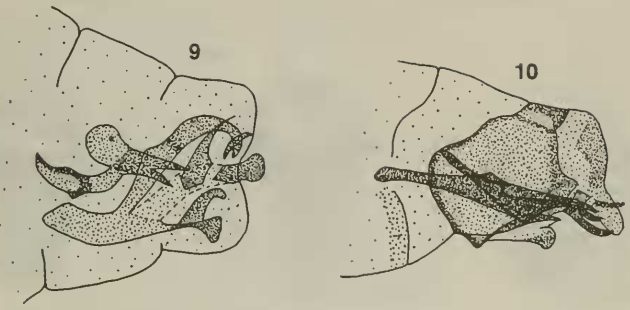
8. Vertical diameter of genital ring obviously less than the vertical height of the hypandrium—about half that height or less. Tip of entoprocessus blunt. With insect aligned with head to left, the parameres are attached to the genital ring between the seven and nine o'clock positions (Fig. 19) ..... *C. (M.) esbenpeterseni*

— Vertical diameter of genital ring approximately the same as vertical height as hypandrium—at any rate greater than half this height. Tip of entoprocessus acute. With the insect aligned with head to the left, the parameres attach to the genital ring at the six o'clock position (Fig. 20) ..... *C. (M.) lentiae*

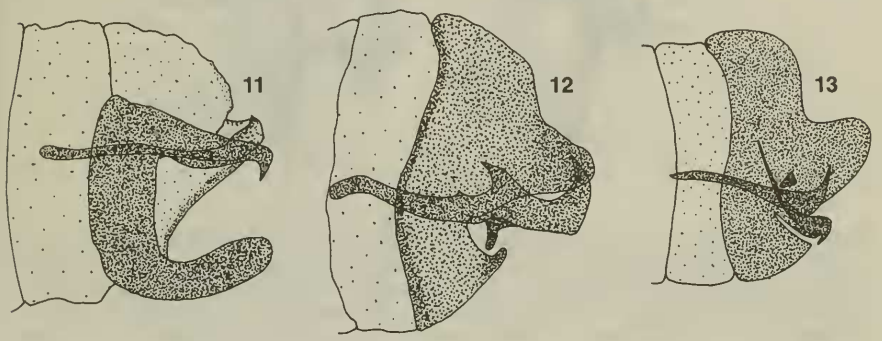
Figures 2–25 follow on pages 112–114.



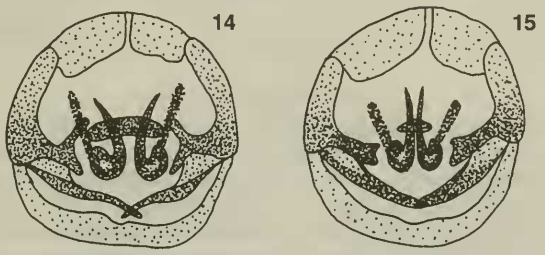
Figs 2–8. Wing venation of British Coniopterygidae. 2: Stylized wing RCV = radial cross-vein, RMCV = radio-medial cross-vein, MCCV = medio-cubital cross-vein, Rs = radial sector. 3: *Aleuropteryx juniperi* Ohm (after Ward, 1970). 4: *Helicoconis lutea* (Wallengren) (after Aspöck *et al.* 1980). 5: *Parasemidalis fuscipennis* (Reuter). 6: *Semidalis aleyrodiformis* (Stephens). 7: *Conwentzia* spp. 8: *Coniopteryx* spp.



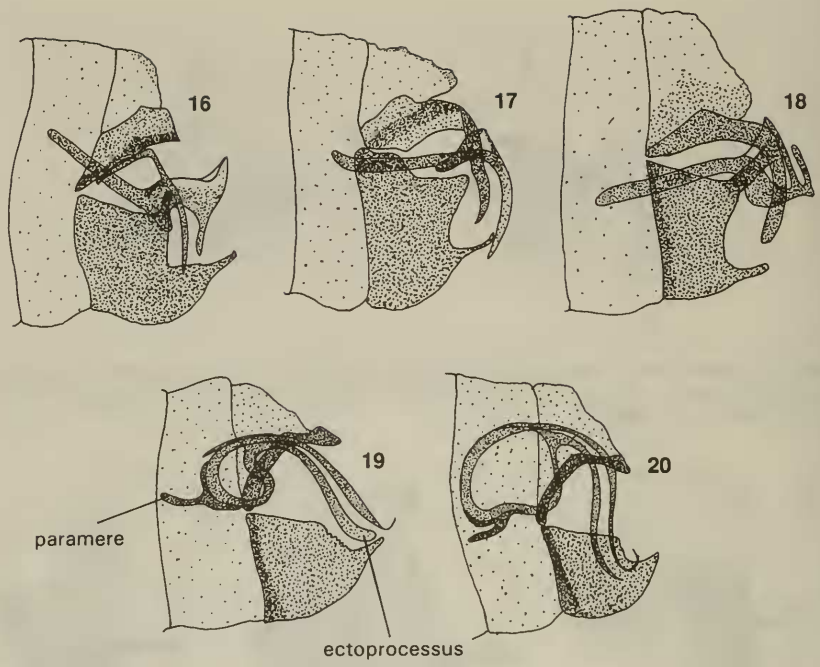
Figs 9–10. Lateral view of male genitalia of Coniopterygidae, subfamily Aleuropteryginae, (insect with head to left). 9: *Aleuropteryx juniperi* Ohm. 10: *Helicoconis lutea* (Wallengren). (Both after Aspöck *et al.*, 1980).



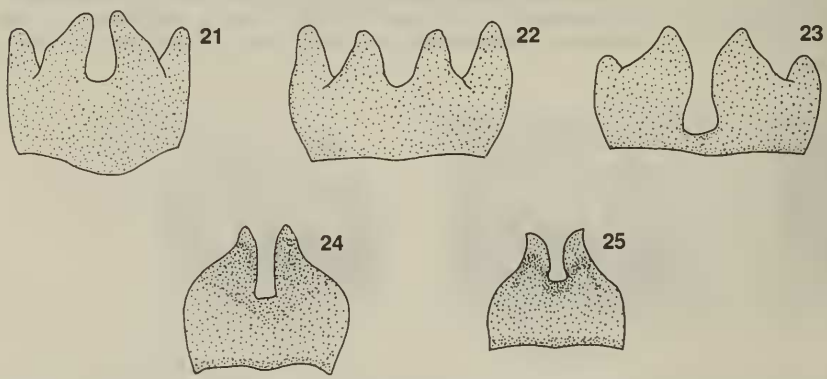
Figs 11–13. Lateral view of male genitalia of Coniopterygidae, subfamily Coniopteryginae, (insect with head to left). 11: *Parasemidalis fuscipennis* (Reuter), Bishop's Stortford, Hertfordshire, 11 July 1990. 12: *Semidalis aleyrodiformis* (Stephens), Yarner Wood, South Devon, June 1988. 13: *Conwentzia* sp., Harpenden, Hertfordshire, September 1989. All specimens in author's collection.



Figs 14–15. Caudal view of male genitalia of *Conwentzia* spp. (insect facing away from observer). 14: *C. pineticola* Enderlein. 15: *C. psociformis* (Curtis). Both, Harpenden, Hertfordshire, September 1989. (In author's collection).



Figs 16–20. Lateral view of male genitalia of *Coniopteryx* spp. (insect with head to left). 16: *C. borealis* Tjeder, Bishop's Stortford, Hertfordshire, 1 August 1990. 17: *C. parthenia*, Woburn, Bedfordshire, 17 June 1990. 18: *C. tineiformis* Curtis, Harpenden, Hertfordshire, June 1989. 19: *C. esbenpeterseni* Tjeder, Harpenden, Hertfordshire, 23 June 1990. 20: *C. lentiae* Aspöck & Aspöck, Harpenden, Hertfordshire, 29 June 1990. All specimens in author's collection.



Figs 21–25. Ventral aspect of Hypandria (ninth sternite) of male *Coniopteryx* spp., (insects aligned with head towards bottom of page). 21: *C. borealis*. 22: *C. parthenia*. 23: *C. tineiformis*. 24: *C. esbenpeterseni*. 25: *C. lentiae*. Data as for Figs 16–20.

Check list of the British Coniopterygidae

Aleuropteryginae Enderlein, 1905
Aleuropteryx Low, 1885
juniperi Ohm, 1968
Helicoconis Enderlein, 1905
lutea (Wallengren, 1871)*
Coniopteryginae Burmeister, 1839
Coniopteryx Curtis, 1834
s.g. *Coniopteryx* Curtis, 1834
borealis Tjeder, 1930
parthenia (Navas & Marcet, 1910)
= *pygmaea* auctt. nec Enderlein, 1906
tineiformis Curtis, 1834
= *lactea* Wesmael, 1836
= *fuscus* Zetterstedt, 1840
= *lacteus* Zetterstedt, 1840
s.g. *Metaconiopteryx* Kis, Nagler & Mandru, 1970
esbenpeterseni Tjeder, 1930
lentiae Aspöck & Aspöck, 1964
Parasemidalis Enderlein, 1905
fuscipennis (Reuter, 1894)
= *annae* Enderlein, 1905
Semidalis Enderlein, 1905
aleyrodiformis (Stephens, 1836)
= *curtisiana* Enderlein, 1906
= *albata* Enderlein, 1907
= *alpina* Withycombe, 1925
= *poincianae* Withycombe, 1925
Conwentzia Enderlein, 1905
pineticola Enderlein, 1905
= *hageni* Banks, 1906
= *reticulata* Tullgren, 1906
= *angulata* Navas, 1914
= *axillata* Navas, 1914
= *cryptoneuris* Bagnall, 1915
psociformis (Curtis, 1834)
= *aphidiformis* Rambur, 1842.

* = doubtfully British.

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traps situated the length and breadth of the British Isles and for passing the samples to me for identification. It is significant that the bulk of recent records of Coniopterygidae have been made from these samples. In this connection I must also thank the many operators of these traps for their efforts on behalf of the lacewing recording scheme as indeed I must also thank all other entomologists who have sent me records from across the country.

Much useful discussion, both verbal and via the written word, has been had over the past few years on the subject of lacewings and for this I am particularly grateful to Peter Barnard and Steven Brooks at the BM(NH), to Bert Hynd, whose world collection of lacewings is undoubtedly the finest in private hands in this country, to Joan Morgan at University College North Wales, Bangor, to Lena Ward at Furzebrook Research Station and to Lita Greve at the Zoological Museum of Bergen University in Norway.

I also thank Steve Brooks for his permission to refer to his critical determination of the Berkshire specimen of *Aleuropteryx juniperi* and Peter Barnard for reading the draft of this address and making a number of useful comments thereon.

Finally, I must thank the staff of the Biological Records Centre at Monks Wood, particularly Brian Eversham and Paul Harding, without whose diverse assistance the lacewing recording scheme would not exist.

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SHORT COMMUNICATION

***Anobium inexpectatum* (Herbst) (Coleoptera: Anobiidae) in Yorkshire.**—A single female of this species was beaten from foliage of wych elm (*Ulmus glabra* Huds.) during a survey of the biological interests of the Braithwaite Hall Estate in Coverdale, North West Yorkshire (VC 65), 17.viii.1987. The elm was growing in the tree-lined rocky gorge of the River Cover to the west of Hullo Bridge (SE115865). *Anobium inexpectatum* was added to the British list by Allen (1977) on the basis of old material standing as *A. punctatum*. My own specimen sat as such in my collection until I spotted it this year! It is mostly known from the southern counties, with Leicestershire—until now—the northernmost to my knowledge.

My thanks to John Owen for confirming my identification.—Keith N. A. Alexander, National Trust, Spitalgate Lane, Cirencester, Glos. GL7 2DE.

Reference

Allen, A. A. 1977. Notes on some British Serricorn Coleoptera, with adjustments to the list.3.—A new British *Anobium*, with notes on three others of the family. *Ent. Mon. Mag.* **112**: 151–154.

***Rhopalum gracile* Wesmael (Hymenoptera: Sphecidae) from E. Norfolk.**—During a biological survey of National Trust properties in Norfolk in 1990, a specimen of this rare wasp was swept from a reed-filled ditch at Heigham Holmes (TG445205), in the Norfolk Broads, on 14.iv.90. Richards (1980) describes this as a rare species, known only from fens in Suffolk and Cambridgeshire. A. Foster (pers. comm.) informs me that the Nature Conservancy Council invertebrate survey of East Anglian fens has also produced records of this species for Broadland, but not as yet from other parts of the survey area. His records are as follows: Catfield (TG3621), specimens in water traps in sedge beds, 1988 and 1989; Hickling (TG4221), in reed and sedge